Accelerating Access to HIV/AIDS Commodities in Sub-Saharan Africa: Cost Estimates



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"In September 2000, Options Consultancy Services in the UK conducted for UNAIDS a modelling analysis of the needs and cost estimates of HIV-related commodities, for the period 2000 to 2005, for the 36 sub-Saharan African countries worst affected by HIV/AIDS. The analysis was revised in June 2001. The key findings of this study are presented in the paper, "Cost Estimates of Commodity Requirements to Support HIV/AIDS Control Programmes in Sub-Saharan Africa" by Andy Barraclough, Katie Chapman, Corinne Grainger and John Richens. The report of modelling the detailed analysis is available on a CD-rom from UNAIDS. For further information on the methodology or findings, please contact Katie Chapman at info@options.co.uk'. "

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Accelerating Access to HIV/AIDS Commodities in Sub-Saharan Africa: Cost Estimates

In response to the devastating impact of the AIDS epidemic, expanding access to commodities of special interest to people living with HIV infection, and those vulnerable to HIV infection, is receiving the urgent attention of global leaders. As the main advocate for global action on HIV/AIDS, UNAIDS requires a strong evidence base from which to determine programme needs and costs, including commodity needs and costs, in order to mobilize additional resources. It is estimated that, by 2005, a total of US\$9 billion in funding will be required annually for prevention, care and treatment and to provide support for orphans. About half of this funding is needed in sub-Saharan Africa.

This paper presents the key findings of a modelling analysis conducted by Options for UNAIDS to provide need and cost estimates of HIV-related commodities for the 36 sub-Saharan African countries worst affected by HIV/AIDS, over the period 2000–2005. The term 'commodities' covers principally male and female condoms, drugs for STI treatment, equipment for collecting and testing blood for HIV, equipment for the safe disposal of needles for injecting drug users, and drugs for treating HIV and related infections. This model does not estimate total commodity needs for HIV control. Rather, it estimates the future commodity requirement that could be delivered through existing health infrastructures with optimistic projections for how coverage will improve over the next five years.

On the basis of this model, estimates of the total cost of the HIV/AIDS commodities required rise dramatically from US\$323 million in the year 2001 to US\$709 million by the year 2005. These costs decrease by a substantial 30–40% when using the recently negotiated prices for antiretrovirals (ARVs) in sub-Saharan Africa, to US\$229 million in 2001 and US\$442 million in 2005. These estimates are presented on a free-on-board basis; that is, they represent the cost of delivering the commodities onto a ship, but exclude carriage, insurance, freight, storage or distribution to a service delivery point. Getting the commodities into the hands of those who need them would cost, on average, an additional third.

Even with the benefit of dramatic ARV drug price reductions, there is a long way to go before sustained financing of commodities to combat the HIV/AIDS pandemic can be achieved. The need for a massive increase in resources is compounded by the immense challenges of strengthening health and supply systems, improving rational selection and use of drugs, further increasing the affordability of drugs (not just ARVs), and minimizing the risks of drug resistance.

Scale of HIV/AIDS epidemic in sub-Saharan Africa

Sub-Saharan Africa combines some of the lowest per capita incomes in the world with massive HIV epidemics and the lowest rates of access to treatment. In 1999, over four million people were newly infected with HIV. In 16 countries in the region, more than 10% of the adult population aged 15–49 years were infected with HIV, and this figure increased to 20% in seven of the southern African countries. This scale of HIV infection presents enormous challenges to national development and to health systems, and the scale of commodities and resources required in sub-Saharan Africa must be determined in order to prevent further infection and to provide care, treatment and support for those already infected.

This paper presents the key findings of a modelling analysis conducted by Options for UNAIDS, initially carried out in September 2000 and revised in June 2001, to provide need and cost estimates of HIV-related commodities for the 36 sub-Saharan African countries worst affected by HIV/AIDS, over the period 2000–2005. The term 'commodities' covers principally male and female condoms, drugs for treating sexually transmitted infections that can enhance HIV transmission, equipment for collecting and testing blood for HIV, equipment for the safe disposal of needles for injecting drug users, and drugs for treating HIV and related infections. The specific commodities were agreed with UNAIDS and WHO, and include female condoms, male condoms, post-exposure prophylaxis (PEP) for occupational exposure and sexual violence, and Cotrimoxazole prophylaxis, in addition to the more common drugs for prevention, treatment and care. Triple ARV therapy is assumed here,

although it is noted that trials of intermittent ARV regimens are being set up in Africa. Commodities that are not included in the model are diagnostics for opportunistic infections, ELISA readers for HIV tests, and viral load tests. The full report provides a carefully documented and explicit basis on which commodity needs and costs for HIV control can be calculated for resource-poor countries, and was developed in close collaboration with staff at UNAIDS and WHOⁱⁱⁱ.

Why focus on accelerating access to commodities?

The June 2001 UNGASS Declaration of Commitment on HIV/AIDS has renewed international commitment to, *inter alia*, increasing the availability of, and non-discriminatory access to, condoms, drugs (including antiretroviral therapy), and diagnostics. Not only are there immense opportunities for rapid health gains through better access to such essential commodities, but access to basic health care, including drugs, is a fundamental human right. Moreover, with drugs typically constituting 50–90% of out-of-pocket spending by poor households, improving equity in access to essential drugs is an urgent policy goal. Since its inception in May 2000, the Accelerating Access partnership has also helped to build momentum for HIV-related drug access.

It is well understood that HIV prevention, care, treatment and support for people living with HIV/AIDS require far more than commodities, but the availability of drugs and condoms is an essential component of increasing access to health care. Efforts to expand access to HIV-related commodities must take into account the technical, financial and social capacities of individuals and the health-care system in each country^{vii}. Well-documented concerns regarding the focus on commodities include the potential inequitable uptake of drugs (especially ARVs), and the inadequacy of the African public health service delivery systems to deliver HIV/AIDS-related drugs effectively and safely^{viii}. Much can be achieved, however, without heavy expenditure on commodities in areas such as health education.

Nevertheless, a commodity-focused model that forecasts volume as well as cost is a vital tool for UNAIDS and partners in dialogue with pharmaceutical companies, and in advocacy for resource mobilization. As the main advocate for global action on HIV/AIDS, UNAIDS requires a strong evidence base from which to determine commodity needs and costs, in order to mobilize additional resources.

Closing the resource gap for commodities

This analysis also estimates international funds committed to HIV-related commodities. Despite national and international resources being mobilized for the prevention and control of HIV/AIDS, there still remains an enormous gap between the estimated needs and current commitment of funds^{ix}. The recent establishment of the Global Fund to Fight AIDS, TB and Malaria signals the increasing momentum in mobilizing international resources. A report released in the lead-up to UNGASS calls for about one-quarter of the new Fund to be used to purchase antiretroviral drugs^x. Similarly, the commitment by the heads of state and governments of the Organisation of African Unity, in Abuja in April 2001, pledging domestic resources to the health sector and a comprehensive multisectoral response to HIV/AIDS, also signals increased national commitment. Furthermore, international funding for African condom distribution is set to increase.

Factors influencing access to essential commodities

Drawing on WHO's framework for essential drug management, improving access to essential drugs, condoms and HIV test kits means addressing four key factors: rational selection and use of drugs, affordable prices, sustainable financing and reliable health and supply systems. Of the four, affordable pricing is the fastest-moving parameter.

The estimates in this paper are based on the number of people thought to have had access to health services in 2000, and make the rather optimistic assumption that this number will increase over the following five years to reach the targets set by the International Partnership against AIDS in Africa. It is important to note that this model does not estimate total commodity needs for HIV control. Instead, it estimates the commodities that could be delivered through existing health infrastructures with optimistic projections for how such infrastructures will improve over the next five years. For example, it is assumed that, in low-programme-strength countries, such as Burkina Faso, only 5% of pregnant urban women with access to antenatal care had a HIV test in 2000, with this figure increasing to 20% by 2005. These figures range from 0% to 10% for rural women. Of those women who test HIV-positive, it is assumed that none was offered a Nevirapine regimen in 2000, but that 90% will be following a Nevirapine regimen in 2005.

The detailed assumptions for each commodity are included in the full reportⁱⁱⁱ. In general, when making assumptions about feasible increases in access to commodities, the model takes the four aforementioned factors into account, as conveyed in Table 1.

Table 1

Factors influencing access	Explanation of factor influencing access to commodities	How model addresses each factor	
Affordable prices	Affordability depends on: transparent price information, competition between manufacturers, lowering or removal of import taxes and other levies, efficient distribution, and fair profit margins.	The original model was developed in 2000 using existing price data from the UNAIDS/UNICEF/WHO 1999 price list, confirmed with manufacturers/suppliers, and UNAIDS data. Unit costs are assumed to increase following a linear projection over 5 years, allowing for inflation, and are presented on a free-on-board basis. The model has since been updated to accommodate the newly-agreed tiered/equity pricing for ARVs in May 2001 (see Table 3 below). Recent developments in pricing of other commodities, such as fluconazole, have not been incorporated, due to their relatively smaller proportion of total commodity costs.	
Rational selection and use of drugs	Involves development and implementation of national guidelines, based on the best available scientific evidence and taking into account cost, patient preferences and other locally important factors. Also involves training and supporting health professionals in effective use of the drugs, and promoting rational use by consumers.	Rational drug selection and use are assumed in the model through adherence to the WHO-approved treatment protocols. Although there is some variation between countries in essential drug lists and national treatment protocols, the model adopts a standard approach to the quantity and type of commodities required per person/case/episode. Adjustment is made for commodities used in the clinical management of opportunistic infections and palliative care for HIV-infected children.	
Sustainable financing	Requires reliance on all viable financing mechanisms, including public revenues, social health insurance, out-of-pocket spending, and international financing through grants, donations and loans, where appropriate.	The study estimated bilateral and multilateral donor-funded resources committed to HIV/AIDS control by reviewing existing data and documentation on resource flows. In the absence of detailed and accurate data, it is assumed that HIV/AIDS commodities account for 36% of HIV/AIDS programming costs. Estimates are based on data from 1996–1998 and extrapolated on the assumption of a 5% increase per annum. Figures do not reflect recent developments outlined above. Data limitations prevent other sources of financing from being included.	
Reliable health and supply systems	Required to ensure continuous availability and assured quality of essential medicines. Supply system improvements are central to health sector development. Effective drug regulation, including drug quality assurance for imported and locally produced drugs, is vital.	Assumptions are made regarding feasible future levels of programme coverage and health system capacity in each country, for each programme strategy. For example, MTCT-related commodities are only costed for those women who have access to antenatal care. Baseline and target coverage levels for each programme strategy are agreed with UNAIDS, and vary by country according to the country's HIV/AIDS programme strength (for prevention) or the country's economic strength (for treatment and care).	

Estimated scale of commodity needs

The model's starting point is that of estimating the size of the potential target group for each intervention that requires HIV-related commodities. This is done through the compilation of available demographic and epidemiological data and health-seeking behaviour studies, combined with programme coverage assumptions, to determine the number of people with access to health facilities who:

- require commodities associated with prevention strategies—condom use, STI treatment and surveillance, injecting drug use needle exchange programmes, Nevirapine for mother-to-child transmission reduction, voluntary counselling and testing (VCT);
- are eligible for TB prophylaxis and Cotrimoxazole prophylaxis;
- require treatment for opportunistic infections—TB, Kaposi's sarcoma, herpes, bacterial pneumonia, candidiasis, cryptococcal infections;
- require palliative care;
- are candidates for antiretroviral therapy, including post-exposure prophylaxis (PEP) after occupational exposure (provision of PEP is a key factor for maintaining health-workers' morale in a very difficult environment) or as victims of sexual violence;
- In addition, HIV test kits are required for HIV sentinel surveillance, strengthening blood banks, and ancillary to ART.

For all 36 countries, the model is based on an estimated 24 million people in sub-Saharan Africa living with HIV in 2000, rising to 27 million in 2005. These figures take into account demographic projections, including the decreasing life expectancy in the worst-hit countries, and projections of the progression of the HIV epidemic. However, many of these people will not have access to the commodities for the reasons stated earlier, and estimates of need are based on those who will feasibly gain access. For all commodities, the *total* unmet need is potentially vast and the agreed assumptions are rather modest as a starting point for some, such as ARVs for post-exposure prophylaxis. The estimated sizes of selected potential target groups, based on a complex set of assumptions, are given in Table 2.

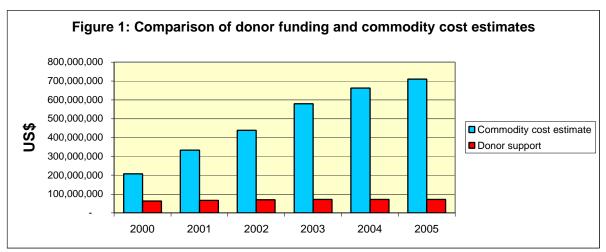
Table 2: Estimates of annual commodity needs required by the year 2005 if IPAA targets for improved programme coverage can be met

Pieces of male condoms used for STI/HIV prevention:	1,146,329,472	
Pregnant women who test positive for HIV/AIDS, are eligible for MTCT prophylaxis, and are offered and complete regimen of ART:	186,288	
Adults treated at clinic for a symptomatic STI (genital ulcer, urethral discharge, vaginal discharge or lower abdominal pain):	12,573,101	
Donated blood units, which are tested:	2,480,555	
Tested adults (those who test positive and negative) through VCT:	19,035,422	
HIV surveillance sites:	490	
Adults needing care, and having access to heath care and receiving OI prophylaxis:	949, 125	
New HIV-related TB cases (infectious and non-infectious) that are candidates for DOTS:	306,137	
HIV-related candidiasis cases that are treated in adults:	8,136,188	
Treated bacterial pneumonia episodes in adults:	271,206	
Total diagnosed episodes receiving palliative care:	12,084,166	
HIV-infected adults entering ART programme:	539,749. Assume that 857,681 people will receive first-line treatment and 221,018 receive second-line treatment.	

Estimated total commodity costs in relation to donor resources

As Figure 1 shows, the total costs of meeting these estimated commodity needs based on the original model assumptions are anticipated to rise dramatically from around US\$208 million per annum in 2000 to US\$709 million by the year 2005. These estimates are presented on a **free-on-board basis**—that is, the cost of delivering the commodities onto a ship, but *excluding* carriage, insurance, freight, storage or distribution to a service delivery point. Getting the commodities into the hands of those who need them would cost, on average, another third on top of these costs. The reader is reminded that **the commodity cost estimates are only for those commodities that can be delivered through the current and anticipated infrastructure, and therefore do not reflect the additional unmet need, which would vastly increase costs. These total costs equate to an average annual per capita requirement of US\$0.37 for 2000, rising to US\$1.12 by 2005 (US\$8.54 and US\$26.54 for HIV-positive adults respectively). With the total health-care expenditure in many sub-Saharan African countries averaging just US\$35 per capita per annum^{xii}, it is unrealistic to expect this amount to be spent on HIV-related commodities alone. Indeed, the average cost of commodities needed to treat opportunistic infections is US\$31 per patient year.**

Setting aside the resource commitments made in the context of the establishment of the Global Fund to Fight AIDS, TB and Malaria, known donor funding for commodities is estimated to increase from only around US\$63 million in 2000 to nearly US\$71 million in 2005. This leaves a significant shortfall, as shown below.

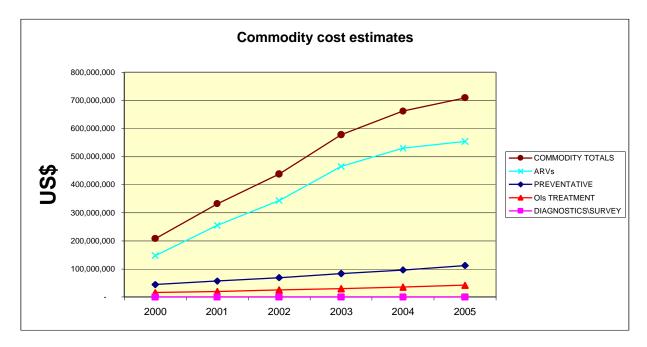


Note: Costs are reported on a free-on-board basis in US\$ for the year 2000.

Great caution should be applied in using the figures for donor support since the information available is certainly incomplete. However, even allowing for a substantial margin of error in the donor figures, the scale of the shortfall between the commodity estimates and the availability of donor funding remains vast.

Relative importance of commodity costs

In the year 2000, the main component of cost is ARV-related but with significant proportions of prevention- (21%) and treatment- (8%) related costs (see Figure 2).



Male and female condoms account for a significant proportion of all prevention costs (63% of the total in 2005), followed by voluntary counselling and testing (VCT) at 14%, STI treatment at 11% and prevention of mother-to-child transmission at 9%. The main components of treatment costs are for candidiasis (36%), TB (23%), Cotrimoxazole prophylaxis and palliative care (15% each).

By the year 2005, the cost of commodities for ARV programmes is even more significant (78%), reflecting the predicted high rates of growth in access to programmes, despite substantial decreases in unit costs. This assumes that, of those people who need antiretroviral therapy and who have general access to health services, 1%, 5% and 15% (depending on the country) have access to specialist antiretroviral therapy centres in 2000, with access rapidly rising to 10%, 25% and 50% in 2005. In this analysis, ARV unit costs were assumed to be US\$7 per day for first-line treatment and US\$12 per day for second-line treatment in 2000, decreasing to US\$4.60 and US\$6 respectively by 2005. The levelling in the cost of the ARVs in 2005 is due to a combination of falling unit prices and the stabilization of HIV prevalence projections.

Effect of ARV unit price reductions on commodity cost estimates

Drug prices feature very prominently as a factor influencing access to care, especially in low-income-country health-care settings. This is especially so with Highly Active Antiretroviral Treatment (HAART) which requires a complex regimen of several expensive drugs. It could therefore be expected that a significant decrease in ARV unit prices would lead to a substantial lessening of the gap to meet the costs of commodities.

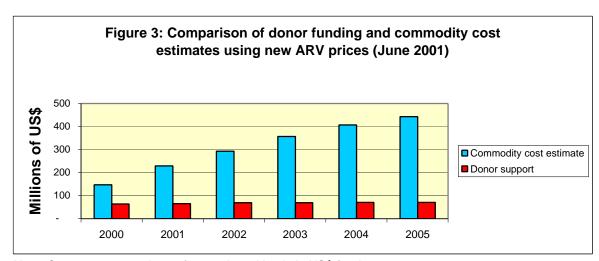
Since May 2000, substantial progress has been made in achieving differential or tiered pricing^{xiii} for HIV/AIDS-related drugs, with competitive offers from both the research and development-based industry and generic drug manufacturers. Manufacturers of both patent drugs and generics have lowered their selling price for low-income countries by approximately 85% of world prices. The extent of price reductions varies by country, in line with its ability to pay, and according to the particular drug and manufacturer. Increased awareness of the importance of approaches that support equity pricing for developing countries was highlighted at the WHO/WTO meeting in Norway in April 2001^{x1v}.This commodity model has been updated using the new prices summarized in Table 3 below, with dramatic results.

Table 3: Typical tiered price variation for antiretrovirals as of June 2001 in US\$

Country economic strength	MTCT: cost of nevirapine for mother and infant	Daily drug cost of ARVs for first- line treatment regime	Daily drug cost of ARVs for second-line treatment regime	Post-exposure prophylaxis kit prices
Least developed countries	Free	2.27	3.17	100 per kit
Low intermediate income	Free	2.91	4.73	100 per kit
High intermediate income	3.34	4.80	5.20	145 per kit

Note: It is assumed that all the above prices will be reduced by 50% by 2005.

The effect of the massive ARV price reductions on the total commodity cost estimates is that of reducing total estimated commodity costs for 2005 to US\$442 million, compared to US\$710 million prior to the introduction of tiered pricing. While this represents a huge 40% reduction in total commodity costs, it makes only a dent in the overall estimated shortfall in donor funding. The reduction in ARV prices means that 16% of the required commodity costs would now be met by the estimated donor funding, which is higher than the 10% at September 2000 prices. In other words, the shortfall in donor funding decreases from ten-fold to six-fold as a result of differential ARV pricing. The gap is still enormous (see Figure 3).



Note: Costs are reported on a free-on-board basis in US\$ for the year 2000.

Despite such a large reduction in unit prices, the proportion of total costs constituted by ARV costs in 2005 drops only from 78%, using September 2000 prices, to 63%, using the new prices. Condoms follow far behind with an increased 17% share. Somewhat surprisingly, there is relatively little reduction in the cost estimates for the MTCT programme—from 9%, based on the September 2000 prices, to 8%, using June 2001 prices, even though Nevirapine is assumed to be supplied free of charge for many of the countries in this model. This situation is due to the importance of the costs of other commodity requirements (HIV test kits and infant formula costs) for which prices remain static. In terms of per capita commodity requirements, the ARV price reductions resulted in a more reasonable US\$0.39 per annum in 2001, rising to US\$0.69 in 2005.

Where do we go from here?

There is a clear need for more reliable data in all areas of the model, and especially for donor funding levels where current data are at best patchy, inconsistent and confusing. It is recommended that coordination and standardization of monitoring, collation and reporting among the various donors should be improved as a matter of urgency. In a number of programme areas, rather broad assumptions have been necessary due to a lack of reliable data, and as better understandings of operational activities and better quality data become available, the model should be refined accordingly. This study should therefore be viewed as a first step in developing a dynamic and interactive model for commodity cost estimates. It is recommended that the modelling approach be used to form the basis for a continually adapting and updated estimate of commodity requirements and costs as better data become available.

The cost estimates are sensitive to HIV prevalence, commodity unit price, access to commodities (programme coverage), and the commodity mix included in the model (treatment protocols):

- According to UNAIDS' projections, HIV prevalence is set to increase and plateau by 2005, as
 reflected in the model; if this assumption does not hold true, the estimates are likely to increase,
 all other things being equal.
- Access to commodities (programme coverage) is restricted by health system capacity, the improvement of which requires substantial long-term investment. Existing service delivery capacity is limited and actions to lower the price of some HIV/AIDS-related drugs has progressed faster than the capacity of health systems to deliver these drugs safely, effectively and on the desired scale. For example, new WHO guidelines^{xv} recommend that programmes require much more than drugs for safe and effective use of antiretroviral therapy, such as reliable laboratory monitoring services to test drug toxicity and monitor viral load. These inputs have resource implications not addressed in this report, such as training health professionals in the use of antiretroviral therapy, and setting up regulatory mechanisms against misuse and misappropriation of drugs.
- It is likely that changes in the commodity mix may be expected within the next five years, with
 increased testing of intermittent, single or dual ARV therapies as less costly alternatives to triple
 therapy, resulting in reduced total cost estimates, all other things being equal. Similarly, there is a
 real risk of multi-drug resistance, for example for the treatment of tuberculosis, which could force
 more expensive drugs into the commodity mix, and hence drive up total cost estimates.
- Of all the above factors, commodity price is the most volatile and this model will become increasingly sensitive to prices. The ARV market is still far from stable and it is very difficult to predict its future direction. While a number of players feel that some ARV drugs are now available at close to base manufacturing cost, and the potential for future significant cost reductions is limited, others consider that there is yet further potential for large cost reductions as the scale of generic manufacturing increases and further tiered pricing agreements are reached with suppliers. Recent developments in the pricing of other essential care drugs, such as free provision by Pfizer of Fluconazole (for treatment of cryptococcal opportunistic infections), will need to be considered when updating this model. With such developments under way, it is likely that overall cost estimates could continue to drop dramatically, all other things remaining equal.

Even with the benefit of drug price reduction initiatives to date, there is a long way to go before sustained financing of commodities to combat the HIV/AIDS pandemic can be achieved. The need for a massive increase in resources is compounded by the immense challenges of strengthening health and supply systems, improving rational selection and use of drugs, further increasing the affordability of drug pricing and minimizing the risks of drug resistance. The question of who benefits from increased access to commodities will also need to be monitored to ensure equitable access.

Endnotes:

- Barraclough A, Chapman K, Grainger C, Richens J, Updated June 2001, Cost Estimates of Commodity Requirements to Support HIV/AIDS Control Programmes in Sub-Saharan Africa. Options Consultancy Services for UNAIDS.
- ^{iv} WHO, 30 March 2001, More Equitable Pricing for Essential Drugs: What do we mean and what are the issues? Background Paper for the WHO-WTO Secretariat workshop on differential pricing and financing of essential drugs, Norway, 8-11 April 2001.
- VHO, 30 March 2001, More Equitable Pricing for Essential Drugs: What do we mean and what are the issues? Background Paper for the WHO-WTO Secretariat workshop on differential pricing and financing of essential drugs, Norway, 8-11 April 2001.
- vi Accelerating Access is a partnership between the UN (UNFPA, UNICEF, WHO, the World Bank and the UNAIDS Secretariat) and the research-based pharmaceutical industry.
- vii UNAIDS Programme Coordinating Board, 5 November 1997, Access to Drugs for HIV/AIDS and Related Illness: towards the creation of strategic partnerships to improve access to care for people living with HIV/AIDS.
- Save the Children, May 2001, The Bitterest Pill of All: the collapse of Africa's health systems. Also, Department for International Development, May 2001, HIV/AIDS Strategy.
- vix 3rd Meeting of Contact Group on Accelerating Access to HIV/AIDS-Related Care, 29 May 2001, Mobilising Resources for Accelerating Access to HIV/AIDS Care. Session 2 background document.
- ^x Schwartlander B et al., June 2001, *Science*. Cited in *The Economist*, 30 June 2001, United Against AIDS? (page 91-92).
- xi The United Nations said it wished to purchase US\$20 million worth of condoms in 2001, while USAID, the largest condom procurer, is set to increase its expenditure on condoms, both male and female¹.
- xii WHO, 2000, The World Health Report. Annex Table 8.
- Differential, preferential, tiered and equity pricing are used interchangeably here to describe the situation where manufacturing companies undertake long-term commitments to make HIV-related drugs, particularly those under patent, available in developing countries at highly reduced prices to reflect their ability to pay, while established markets are protected.

¹ UNAIDS, 2000, Report on the Global HIV/AIDS Epidemic.

Benin, Botswana, Burkina Faso, Burundi, Cameroon, Central African Republic, Congo, Côte d'Ivoire, Democratic Republic of Congo, Djibouti, Ethiopia, Gabon, Gambia, Ghana, Guinea, Guinea Bissau, Kenya, Lesotho, Madagascar, Malawi, Mali, Mauritius, Mozambique, Namibia, Niger, Nigeria, Rwanda, Senegal, Sierra Leone, South Africa, Swaziland, Togo, Uganda, United Republic of Tanzania, Zambia, Zimbabwe.

xiv WHO/EDM cited in WHO 2001 - see footnote v.

^{xv} WHO, 2000, Guidelines on Safe and Effective Use of ART in Adults with Particular Reference to Resource-Poor Settings. See also Gilks C, June 2000, Provision of Antiretroviral Therapy for People with HIV/AIDS in Developing Countries. JSI (UK) for DFID.

